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Stabilizing Various Bicontinuous Morphologies via Polydispersity of Diblock Copolymers CHI TO LAI, AN-CHANG SHI, McMaster Univ — Diblock copolymers are macromolecules composed of two chemically distinct homopolymers covalently bound end-to-end. The ability to self-assembly into a wide variety of ordered periodic structures, as means of minimizing the free energy, is their most well-studied property. There are many factors affecting the observed equilibrium morphology, one of which is polydispersity. The phase behaviour of polydispersed diblock copolymers is more rich, and diverse when compared to their monodispersed counterpart. The rich behaviour of polydispersed diblock copolymers provides an opportunity to engineer novel morphologies which are not available in monodispersed systems. Using the self-consistent field theory (SCFT), we explore the possibility of exploiting polydispersity of diblock copolymers in binary mixtures to stabilize the various bicontinuous phases, such as the double-diamond morphology. Specifically, solutions of the SCFT equations corresponding to different bicontinuous phases are obtained numerically for binary mixtures of diblock copolymers. The relative stability of the different ordered phases is examined by comparing their free energy. From the study, we determine optimal sets of parameters that stabilize the double-diamond or other exotic morphologies.

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